EML2322L – MAE Design and Manufacturing Laboratory

Common Student Mistakes

The following list contains common mistakes students make when working in the lab during the second half of the semester. By reviewing this list each semester and continuously adding to it we should become more sensitive to the areas we need to focus on more.

Mistake legend:

personal safety mistake
equipment safety mistake
non-safety related mistake

A. **Lathe mistakes:**
1. leaving the chuck key in the chuck **(CLICK LINK FOR VIDEO ILLUSTRATION)**
2. reaching over the rotating chuck for **ANY** reason (i.e. to apply oil, zero the DRO, or file)
3. failing to wait for spindle to **COMPLETELY** stop before cleaning or inspecting workpiece
4. pulling chips off the machine or out of the chip pan using bare hands
5. failure to engage the workpiece **GENTLY** each time
6. running/ramming the cutting tool into part when moving the wrong way (avoid this by always moving the axes **SLOWLY** until sure of direction)
7. always check direction of power feed before cutting into workpiece
8. failure to keep hand on power feed handle ANY TIME the power feed is enabled
9. forgetting to start with a Ø1/4" pilot drill (and not a smaller size) whenever possible
10. retracting the tailstock quill past the ½" mark, which releases the drill chuck from the quill
11. being too rough with the chip pan during cleanup (close it **GENTLY** each time)
12. not adjusting spindle speeds **(while machines are running!)** to match tool sizes **(use the speed charts posted on the clipboards by each machine)**

B. **Mill mistakes:**
1. not locking spindle in upper-most position before changing tools over plastic table covers
2. not using a rag to protect hand when loading or removing endmills
3. not checking speed range or direction of spindle rotation **EVERY TIME**
4. failure to engage the workpiece **GENTLY** each time
5. running/ramming the cutting tool into part when moving the wrong way (avoid this by always moving the axes **SLOWLY** until sure of direction)
6. forgetting to keep a hand on joystick and table when using power feed
7. failing to wait for spindle to **COMPLETELY** stop before cleaning or inspecting workpiece
8. forgetting to ask TAs to change the (HI/LOW) speed range on the milling machines
9. forgetting to remove parallels or to transport them carefully with one in each hand
10. not adjusting spindle speeds **(while machines are running!)** to match tool sizes **(use the speed charts posted on the clipboards by each machine)**
11. spinning an **edge-finder over 1000 rpm,** even for a few seconds
12. forgetting to offset for the radius of the cylindrical edge finder (0.1") or changing the Z-axis height while using the conical edge finder

C. **Drill press mistakes**
1. forgetting to rest the vise against the vertical support column on the drill press
2. trying to support workpieces by hand instead of with a clamp
3. forgetting to use center drills when making precision holes

D. **Sheetmetal mistakes**
1. operating a shear with two people (this can cause **SEVERE** injury)
2. not wearing gloves when using non-powered sheetmetal equipment
3. wearing gloves when operating the bandsaw or drill press
4. attempting to drill sheetmetal while holding it by hand (always use a vise instead)
5. using vise grips instead of c-clamps to secure sheetmetal to the table for grinding
6. failing to wear safety glasses when operating sheetmetal equipment
7. failing to debur parts immediately after cutting (sheared edges are **RAZOR** sharp)
8. accidentally pinching fingers between larger sheets of metal on the material rack
9. calling "ears" and striking part simultaneously instead of waiting a few seconds
10. forgetting that even deburred sheetmetal can pose a risk to exposed skin
11. mixing up order of operation on sheetmetal equipment (punch holes, then bend!)

E. **Welding mistakes**
1. forgetting to turn on the shielding gas when welding
2. failing to call "EYES!" and wait 2 full seconds before starting to weld
3. accidentally hitting the MIG welder trigger before lowering your helmet and calling "EYES!"
4. forgetting that every piece of metal on the welding table may be **EXTREMELY HOT**

F. **General safety mistakes:**
1. failing to eat before coming to lab; becoming light-headed or not being able to focus present definite risks to your personal safety, so please try to avoid working on an empty stomach
2. failing to wear jeans or other pants with thick fabric that will protect your lower body
3. failing to remove rings, watches and bracelets on hands and wrists
4. failing to wear safety glasses **OVER THEIR EYES** when working at the tables (safety glasses cannot help if sitting on top of their heads instead of over their eyes!)
5. failure to wear corrective lenses if you require them, so you can clearly see what you're doing
6. failing to debur **EVERY** workpiece cut in the lab (especially sheetmetal); remember that **ANY** piece of material found in the lab can be as sharp as a knife
7. **NEVER** touch metal shavings with your bare hands
8. hurrying for **ANY** reason while manufacturing a workpiece or moving through the lab
9. failing to keep floor free of obstructions and slip hazards (work on tables, not on floors)
10. doing anything that would make a loud noise without warning to others working around you
11. distracting another student while (s)he is performing an operation on a machine instead of waiting to talk to them between tasks, when it is safe
12. failing to ask for help any time you are unsure about anything; if the material was covered in your safety sheets, you should review them first, but after doing so, please ask your questions

G. **General productivity mistakes:**
1. ceasing work after finishing scheduled weekly tasks (instead of advancing to the next task)
2. failure of **ALL** students to understand how **EVERY** part of their final design works
3. failing to **SHARE** tasks during the design phase and **SEPARATE** tasks during manufacturing phase (if you need help during prototyping, ask a TA)
4. failing to plan your weekly lab sessions by completing **EVERY** assignment during the design phase and coming to TA hours during the manufacturing phase to fill out all necessary paperwork and put together a plan of action for the weekly activities
5. accepting excuses from team members that he/she isn't very good at one skill (i.e. CAD work), so she/he will help more in another phase of the project (i.e. manufacturing); the project requires **EQUAL EFFORT** from **EVERYONE** in the design **AND** manufacturing phases, and to accept less is simply foolish

6. even if groups think they won't need it, maintain adequate team meeting documentation because it helps organize the team to work more efficiently AND is obviously available should it be necessary later in the project
7. failing to print COPIES of the pertinent drawings / schedule needed for fabrication while we have the second submission of D.R.3 for grading

H. **Miscellaneous mistakes:**
1. forgetting to return calipers and parallels to their storage boxes when not in use
2. forgetting to use oil when drilling or when making depth cuts deeper than 0.020″
3. ineffective filing method (not using full stroke length of file, or moving the file the wrong direction (it only cuts moving AWAY from your body))
4. never look away when a machine is running; conversely, never use a machine when distracted
5. failure to make sure drill bits and workpieces are properly centered in their respective chucks before tightening
6. failure to monitor when the drill passes through the material so you don't continue to drill into the work vise or chuck; the moment you feel the drilling force drop off, stop and investigate
7. failing to exercise extreme caution while testing a high RPM motor, (i.e. don't hold onto the 3500 RPM globe motor with one hand while applying power with the other!); in addition, a motor hub with screws extending past the back of it become very dangerous when the motor is spinning and you hold it in your hand
8. forgetting to turn the control box off when making any mechanical or electrical changes to the robot (a teammate's finger could be caught in a moving mechanism, or the controller electronics can get smoked)